

## I. INTRODUCTION

- A. Purpose: To provide information relative to the hazards of Organic Peroxides and to provide additional requirements not covered in Article 80 of the Los Angeles County Fire Code.

BACKGROUND: Organic Peroxides are widely used in the plastics and fiberglass industries for initiating the chemical reaction of other chemicals (monomers) to produce a desired product. Peroxides are available as solids (usually as finely divided powders), liquids, or pastes. The major hazard of Organic Peroxide is its ability to decompose into a shock or thermal sensitive explosive when subjected to a wide range of temperatures. Contamination of some Organic Peroxides has also been known to cause reactive explosions.

- B. Scope: This regulation is for all personnel with fire suppression or fire prevention code enforcement responsibilities.
1. This regulation shall apply to all facilities engaged in the manufacture, dispensing, mixing, storage, handling and use of Organic Peroxides.
  2. The transportation of this material on public streets and highways is regulated by the Department of Transportation (D.O.T.). Application of this regulation shall apply to control of the product while on private property.
- C. Author: The Deputy Chief of the Prevention Services Bureau, through the Assistant Fire Chief (Fire Marshal) of the Fire Prevention Division, is responsible for the content, revision, and periodic review of this regulation.
- D. Authority:
1. County of Los Angeles Fire Code, Title 32 of the Los Angeles County Code, also herein referred to as the Fire Code.
  2. Factory Mutual Engineering Corp., Property Loss Prevention Data Sheets, Organic Peroxides Standard 7-80, May 1998
  3. N.F.P.A. 432, Storage of Organic Peroxide Formulations.

E. Objectives:

1. Identify the six classes of Organic Peroxides and the associated hazards within that classification.
2. Define inspection and permitting responsibilities pertaining to Organic Peroxides, within the Los Angeles County Fire Department.
3. Establish the maximum allowable quantities of Organic Peroxide, related to its processing, handling, storage and use, prior to requiring detached storage by facilities within the jurisdiction of the Los Angeles County Fire Department.

F. Definitions:

1. Organic Peroxide Hazard Classifications:
  - a. **Unclassified-Detonable.** Unclassified peroxides which are capable of detonation. These peroxides present an extremely high explosion hazard through rapid explosive decomposition and are regulated in accordance with Article 77, F.C., as required for high explosives, Division 1.1.
  - b. **Class I.** Class I peroxides present a high explosion hazard through easily initiated, rapid explosive decomposition. This group may include peroxides that are relatively safe under highly controlled temperatures or in a liquid solution where loss of temperature control or crystallization out of solution can result in severe explosive decomposition.
  - c. **Class II.** Class II peroxides present an immediate explosion hazard. That is, an explosive decomposition is not as rapid, violent or complete as that produced by a Class I material. As with Class I materials, this group may also contain peroxides that are relatively safe under controlled temperatures or when mixed with a diluent.
  - d. **Class III.** Class III peroxides present moderate explosion and severe fire hazards. They have characteristics that can be easily contained by normal sprinkler systems and firewalls.
  - e. **Class IV.** Class IV peroxides have moderate fire hazard characteristics that can be easily contained by normal sprinkler systems and firewalls.

- f. **Class V.** Class V peroxides present a low or negligible fire hazard. With these peroxides, combustible packing materials may present a greater hazard than the peroxide itself.

## **II. RESPONSIBILITY**

- A. All Uniform Personnel: Shall familiarize themselves with this regulation so that they may inform the public of the proper procedures pertaining to the storage, handling, use, enforcement and permitting of Organic Peroxides.
- B. Area Unit Fire Prevention Personnel: Shall be responsible for inspection and issuance of permits for all Organic Peroxide manufacturing facilities 20,000 square feet or more and warehousing 60,000 square feet or more. Inspection responsibility is for quantities up to the exempt amounts, according to Table 105-C, Table 8001.15-A and 8001.15-C, Los Angeles County Fire Code, Title 32.
- C. Petroleum-Chemical Unit Personnel: Shall be responsible for inspection and issuance of permits for all facilities with Organic Peroxides in excess of the exempt amounts, according to Table 105-C, Table 8001.15-A and 8001.15-C, Los Angeles County Fire Code, Title 32.

## **III. POLICY**

- A. The recognition and regulation of Organic Peroxides by members of this Department may very well prevent a potential disaster from occurring. All members of this Department shall make every effort to recognize these potentially dangerous materials during routine fire prevention inspections and take appropriate action to safeguard their storage and use.

## **IV. PROCEDURES**

- A. Maximum Allowable Quantity of Organic Peroxide - Inside Storage. Storage quantities and amounts utilized for process areas within manufacturing facilities shall be in accordance with these procedures. Quantities given are based on the total weight of the contents.

1. Process areas within manufacturing facilities.
  - a. Unclassifieds. Immediate needs only allowed in process areas.
  - b. Class I. Immediate needs only allowed in process areas.
  - c. Class II. Immediate needs only allowed in process areas.
  - d. Class III. Needs for the on duty shift only.
  - e. Class IV. One Day supply only.
  - f. Class V. Unlimited-taking into consideration packing materials; housekeeping; exposure to and from other storage areas and occupancies.
2. Storage areas. The maximum quantity per building in a mixed-occupancy shall not exceed the amounts listed in these procedures.
  - a. Unclassified. Stored in accordance with Article 77 as required for high explosives, Division 1.1.
  - b. Class I. 20 pounds, stored in their original DOT shipping containers or tanks.
  - c. Class II. 200 pounds stored in their original DOT shipping containers or tanks.
  - d. Class III. 2,000 pounds, stored in their original DOT shipping containers or tanks.
  - e. Class IV. 200,000 pounds, stored in their original DOT shipping containers or tanks.
  - f. Class V. Unlimited-taking into consideration packing materials; housekeeping; exposure to and from other storage areas and occupancies.

3. Dispensing or mixing operations, with or without storage. The maximum quantity per building in a mixed-occupancy, with dispensing or mixing operations shall not exceed the amounts listed in these procedures.
  - a. Unclassified. Stored in accordance with Article 77 as required for high explosives, Division 1.1.
  - b. Class I. 10 pounds, stored in their original DOT shipping containers or tanks.
  - c. Class II. 100 pounds, stored in their original DOT shipping containers or tanks.
  - d. Class III. 1,000 pounds, stored in their original DOT shipping containers or tanks.
  - e. Class IV. 20,000 pounds, stored in their original DOT shipping containers or tanks.
  - f. Class V. Unlimited-taking into consideration packing materials; housekeeping; exposure to and from other storage areas and occupancies.

B. Detached storage area requirements. Organic Peroxides exceeding the amounts set forth in the procedures above shall be in detached storage.

1. Storage areas within detached buildings. The maximum quantity per detached building shall not exceed the amounts listed in these procedures.
  - a. Unclassified. Stored in accordance with Article 77 as required for high explosives 1.1.
  - b. Class I. 1,000 pounds, stored in their original DOT shipping containers or tanks.
  - c. Class II. 10,000 pounds, stored in their original DOT shipping containers or tanks.
  - d. Class III. 100,000 pounds, stored in their original DOT shipping containers or tanks.
  - e. Class IV. 500,000 pounds, stored in their original DOT shipping containers or tanks.

- f. Class V. Unlimited-taking into consideration packing materials; housekeeping; exposure to and from other storage areas and occupancies.
- 2. Dispensing or mixing operations in detached buildings, with or without storage. The maximum quantity per detached building shall not exceed the amounts listed in these procedures.
  - a. Unclassified. Stored in accordance with Article 77 as required for high explosives, Division 1.1.
  - b. Class I. 10 pounds, stored in their original DOT shipping containers or tanks.
  - c. Class II. 100 pounds, stored in their original DOT shipping containers or tanks.
  - d. Class III. 1,000 pounds, stored in their original DOT shipping containers or tanks.
  - e. Class IV. 20,000 pounds, stored in their original DOT shipping containers or tanks.
  - f. Class V. Unlimited-taking into consideration packing materials; housekeeping; exposure to and from other storage areas and occupancies.
- C. Maximum storage amounts of Organic Peroxides in laboratories. The maximum quantity per 5,000 square feet floor space in laboratories shall not exceed the amounts listed in these procedures.
  - 1. Class I. 2 pounds, stored in their original shipping containers or tanks.
  - 2. Class II. 20 pounds, stored in their original DOT shipping container or tanks.
  - 3. Class III. 200 pounds, stored in their original DOT shipping containers or tanks.
  - 4. Class IV. 500 pounds, stored in their original DOT shipping containers or tanks.

5. Class V. 500 pounds, stored in their original DOT shipping containers or tanks.
- D. Maximum Allowable Quantity of Organic Peroxide - Outside Storage.  
Outside storage quantities shall be in accordance with these procedures.  
Quantities given are based on the total weight of the contents.
1. Unclassified. Stored in accordance with Article 77 as required for high explosives Division 1.1.
  2. Class I. 20 pounds, stored in their original DOT shipping containers or tanks.
  3. Class II. 200 pounds, stored in their original DOT shipping containers or tanks.
  4. Class III. 2,000 pounds, stored in their original DOT shipping containers or tanks.
  5. Class IV. 200,000 pounds, stored in their original DOT shipping containers or tanks.
  6. Class V. Unlimited-taking into consideration packing materials; housekeeping; exposure to and from other storage areas and occupancies.

**Exceptions:**

1. Where Class I, II, or III peroxides are stored together, the sum of the amount of Class I, plus  $1/10^{\text{th}}$  of the amount of Class II, plus  $1/10^{\text{th}}$  of the amount of Class III, should not exceed the maximum allowable amount for the most hazardous class present.
2. Where Class IV and V peroxides are stored together, the sum of the amount of Class IV plus  $1/5^{\text{th}}$  of the amount of Class V should not exceed the maximum allowable amount of Class IV.
3. Class IV and V peroxides should not be stored with Class I, II and III peroxides. However, the total of Class IV and V may equal the total of Class I, II and III.

E. Building Construction.

1. Where any Class I Organic Peroxide formulations are stored in excess of 100 pounds, internal walls and any wall, roof, or ceiling that joins with another occupied building shall be capable of withstanding an internal overpressure of 432 pounds per square foot.
2. Where Class II or any refrigerated Organic Peroxide formulations are stored, any internal walls or any wall, roof, or ceiling that joins with another occupied building shall be capable of withstanding an internal overpressure of 125 pounds per square foot.
3. For Class I, Class II, or any refrigerated Organic Peroxide formulation that gives off flammable gases upon decomposition, the storage area shall be provided with deflagration venting. In no event shall this venting be less than 1 square foot of venting area to 30 cubic feet of volume.

F. Separation. Storage areas for Organic Peroxides shall be located a minimum distance of 25 feet from other hazardous material storage, or separated by a 1-hour fire-resistive, liquid-tight wall. A minimum of 8 feet of clear space shall be maintained between Organic Peroxide storage and any other storage. This application shall be for inside and outside storage.

G. Storage Arrangements. A storage plan shall be provided with all applications for permits. The plan shall indicate the intended storage arrangements, including the location and dimensions of aisles. Storage arrangements for Organic Peroxides shall be according to these procedures, and shall comply with all of the following:

1. Containers and packages in storage areas shall be closed.
2. Bulk storage shall not be in piles or bins.
3. A minimum 2-foot clear space shall be maintained between storage and uninsulated metal walls.
4. Fifty-five gallon drums shall not be stored more than one drum high.
5. Location in buildings. The storage of Class I and II Organic Peroxides shall be on the ground floor. Class III Organic Peroxides shall not be stored in basements.
6. Contamination. Organic Peroxides shall be stored in their original DOT shipping containers. During storage, care should be taken to prevent contamination.



7. Organic Peroxide Storage Cabinets. When storage cabinets are used to comply with this regulation, such cabinets shall be constructed in accordance with 8001.10.6.2, Los Angeles County Fire Code.
8. Storage arrangement of Class I Organic Peroxides shall be in accordance with Table 8003.7-C, Los Angeles County Fire Code.
  - a. Piles-Maximum width. 6 feet
  - b. Piles-Maximum height. 8 feet
  - c. Piles-Minimum distance to next pile. 4 feet
    - (1) At least one main aisle with a minimum width of 8 feet shall divide the storage area.
  - d. Piles-Minimum distance to walls. 4 feet
    - (1) Distance to non-combustible walls is allowed to be reduced to 2 feet.
9. Storage arrangement of Class II and III Organic Peroxides shall be in accordance with Table 8003.7-D, Los Angeles County Fire Code.
  - a. Piles-Maximum width. 10 feet
  - b. Piles-Maximum height. 8 feet
  - c. Piles Minimum distance to next pile. 4 feet
    - (1) At least one main aisle with a minimum width of 8 feet shall divide the storage area.
  - d. Minimum distance to walls. 4 feet
    - (1) Distance to non-combustible walls is allowed to be reduced to 2 feet.
10. Storage arrangement of Class IV Organic Peroxides shall be in accordance with Table 8003.7-E, Los Angeles County Fire Code.
  - a. Piles-Maximum width. 16 feet
  - b. Piles-Maximum height. 10 feet

c. Piles Minimum distance to next pile. 3 feet

(1) At least one main aisle with a minimum width of 8 feet shall divide the storage area.

(2) Distance shall not be less than one-half the pile height.

d. Minimum distance to walls. 4 feet

I. General Requirements.

1. Fire-Extinguishing Systems. Indoor storage of Organic Peroxides shall be protected by an automatic sprinkler system. The design of the sprinkler system shall not be less than that required by the Building Code for Extra Hazard Group 2 with a minimum design area of 3,000 square feet.
2. Smoke Detection. An approved supervised smoke-detection system shall be provided in rooms or areas where Class I, II, III or IV Organic Peroxides are stored. Activation of the detection system shall sound a local alarm.
3. Distances from detached buildings and outdoor storage to exposures and other areas.
  - a. The minimum separation from detached buildings and outdoor storage containing Organic Peroxides to other buildings, property lines, streets, alleys, public ways or exits to a public way shall be in accordance with Table 8003.7-A and 8003.7-B, Los Angeles
4. Spill Control and Secondary Containment. Spill control and secondary containment shall be provided according to 8003.1.3 and Table 8003.1-A, Los Angeles County Fire Code.
5. Smoke and heat venting shall be provided. The design criteria shall be as set forth in the Building Code.
6. Electrical wiring and equipment in storage areas for Class I or II Organic Peroxides shall comply with the requirements for electrical Class I, Division 2 locations.
7. When dispensing of peroxides is required, bonding and grounding shall be provided.

8. Storage of peroxides shall be located in cool, dry areas in which temperatures shall not exceed that recommended by the manufacturer.
9. When refrigerators or freezers are needed for the storage of Class I, II or III peroxides, explosion-proof models shall be provided.
10. Shelving shall be of substantial construction, with adequate seismic bracing and anchoring.
11. Explosion Control. Indoor storage rooms, areas and buildings containing unclassified detonable and Class I Organic Peroxides shall be provided with explosion control in accordance with the Building Code.
12. Standby Power. Organic Peroxides requiring storage in temperature controlled environments or other electrically operated systems, such systems shall be connected to a secondary source of power to automatically supply electrical power in the event of loss of power from the primary source.
13. Signs. Readily legible warning placards shall be prominently placed at locations where Organic Peroxides are stored or used. The signs shall be black lettering on yellow background and read "Organic Peroxides", as per nationally recognized standards. The signs will be identified by the most severe class and be recognizable from a distance of 50 feet.
14. Smoking, open flames, spark-producing tools and devices shall be prohibited in all Organic Peroxide areas.
15. Additional Requirements-Outdoor Storage.
  - a. Weather Protection. Storage of Organic Peroxides outside shall require weather protection in accordance with 8003.1.14 Los Angeles County Fire Code.
  - b. Security. Storage of Organic Peroxides outside shall be secured against unauthorized entry and safeguarded.
  - c. Protection from Vehicles. Storage of Organic Peroxides outside shall require guard posts or other approved means, to protect containers subject to vehicular damage in accordance with 8001.11.3, Los Angeles County Fire Code.